

Supporting Information for Statement of Basis

Prepared for

Union Carbide Corporation

January 2017



Contents

Section	Page
I. Introduction.....	1
II. Facility Background.....	1
III. SWMU/AOC Summary.....	1
IV. Environmental Investigations Summary	2
V. Remedial Action Objectives	2
VI. Implemented Remedial Measures	2
VII. Final Proposed Measures and Implementation	3
A Engineered Remedies.....	3
B Institutional Controls	3
Types of ICs.....	3
Groundwater Performance Monitoring Plan.....	4
Environmental Covenants with Neighboring Property Owners	5
C Materials Management Plan	5
VIII. Evaluation of Final Proposed Remedy.....	5
A Threshold Criteria	5
Protect Human Health and the Environment	5
Achieve Media Cleanup Objectives.....	6
Remediating the Source of Releases.....	6
B Balancing/Evaluation Criteria.....	6
Long-Term Effectiveness.....	6
Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents.....	7
Short-Term Effectiveness	7
Implementation	7
Cost	7
Community Acceptance.....	7
State Support/Agency Acceptance.....	7
IX. Financial Assurance.....	7
Attachment 1	Administrative Record File Index
Table 1	Investigation, Permitting, and Remedial Action Timeline
Table 2	Exposure Unit, Solid Waste Management Unit, Area of Concern, and Corrective Measure Study Area Summary
Figure 1	Facility Location and Neighboring Properties
Figure 2	Facility Features

I. Introduction

This document has been prepared to support preparation of a Statement of Basis regarding a proposed remedy at the Union Carbide Corporation (UCC) Institute Facility located in Institute, West Virginia (hereafter referred to as the “facility”). The proposed remedy varies across different areas of the facility as informed by impacts and land use, and includes engineered remedies as well as institutional controls to implement land and groundwater use restrictions.

The facility is subject to the Corrective Action (CA) Program under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA) of 1976, and the Hazardous and Solid Waste Amendments (HSWA) of 1984, United States Code (U.S.C.) Title 42 — The Public Health and Welfare, Chapter 82 — Solid Waste Disposal, Subchapter I — General Provisions, §§ 6901 et seq. (Corrective Action Program). The RCRA CA Program is designed to ensure that certain facilities subject to RCRA have investigated and cleaned up releases of hazardous waste and hazardous constituents that have occurred at their property.

II. Facility Background

The 433-acre facility is an industrial park located between the Kanawha River to the south, West Virginia State Route 25 to the north, the former UCC Private Trucking Operations (PTO) site to the west, and West Virginia State University (WVSU) to the east (Figure 1). The facility began operations in 1943 during World War II as a synthetic rubber production plant and was owned by the federal government. UCC purchased and operated the facility from 1947 until 1986, at which time it was purchased by Rhone-Poulenc, which became Aventis CropScience in January 2000. Aventis CropScience subsequently became Bayer Cropscience in 2002. The facility was repurchased by UCC in 2015.

The facility consists of two distinct areas: the main chemical plant and the wastewater treatment unit (WWTU) (Figure 1). These areas are separated by approximately 55 acres of intervening property that includes an Appalachian Power Company (APCO) transformer substation, aggregate dock, and undeveloped land owned by UCC. The main chemical plant, which historically produced various hydrocarbon and agricultural products, currently produces products for agricultural use as well as those used in consumer goods.

The facility has a RCRA CA permit issued by USEPA in December 1990, effective January 22, 1991, to January 21, 2001, that was subsequently extended. USEPA Region 3 initiated an RCRA CA permitting action on or about November 1984 to identify and remediate onsite Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs). The permit identified 18 SWMUs, and five additional SWMUs were identified by the facility and included in a *Verification Investigation Work Plan* (REMCOR 1992). The West Virginia Department of Environmental Protection (WVDEP) is the lead agency for implementing the RCRA CA permit. The WVDEP and USEPA agreed in 2011 that CA measures for the WWTU would be addressed by the RCRA CA permit issued for the main chemical plant (USEPA 2011).

III. SWMU/AOC Summary

The history of the various facility SWMUs, permitting process, and investigation and reporting timeline is summarized in Table 1. The facility’s 23 SWMUs and four AOCs were identified in the 1980s and 1990s in association with the RCRA hazardous waste permitting application and permitting processes for the facility. Pursuant to the early investigation findings, USEPA required that potential sources of contamination receive further investigation. Names

and descriptions for each of the SWMUs/AOCs are detailed in Table 2 and organized by Exposure Unit (EU). EUs were defined for the human health risk assessment (HHRA) and divide the facility based on available environmental data, geographical location, operational history, SWMU and AOC boundaries, and existing CA areas (CH2M 2011a) (Figure 2).

IV. Environmental Investigations Summary

Between 1986 and 2016, numerous environmental investigations were conducted at the facility as indicated on Table 1. In addition, interim remedial actions were completed at the facility during this 30-year period, resulting in the closure of some SWMUs/AOCs as noted on Table 2. During environmental investigation and data evaluation for the facility, soil and groundwater data were compiled for each EU (EUs 1 through 8) and for the neighboring (offsite) APCO and WVSU properties. Groundwater concentrations were screened against federal maximum contaminant levels (MCLs) promulgated pursuant to Title 42 U.S.C. §§ 300f et seq. of the Safe Drinking Water Act and codified at 40 CFR Part 141, or USEPA Regional Screening Levels (RSLs) for constituents for which no MCL is available. Soil concentrations were screened against USEPA RSLs for industrial soil.

V. Remedial Action Objectives

The overall objectives for corrective measures at the facility are to protect human health and the environment, and to satisfy RCRA CA requirements while identifying redevelopment and beneficial reuse opportunities. WVDEP expects final remedies to return usable groundwater to its maximum beneficial use, where practicable, within a timeframe that is reasonable. Until groundwater is restored to MCLs, WVDEP expects facilities to prevent or minimize the further migration of a plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction.

The remedial action objectives (RAOs) for the facility for various media are as follows:

1. Manage waste materials and contaminated soil in place with appropriate barriers and institutional and engineering controls to prevent exposures that have the potential to result in risks above action thresholds (i.e., an excess lifetime cancer risk [ELCR] of 1×10^{-4} and a hazard index [HI] equal to 1).
2. Require institutional and engineering controls to prevent potential exposure from vapor intrusion (VI).
3. Reduce mass in soil and/or reduce infiltration rates to minimize leaching to groundwater underlying the facility.
4. Prevent human exposure to groundwater by prohibiting groundwater use at the facility.
5. Prevent groundwater from discharging to surface water at concentrations exceeding surface water quality criteria.
6. Use focused remedies (for example “hot spot” treatment coupled with monitoring progress toward meeting cleanup criteria).
7. Demonstrate no further action needed, where appropriate.

VI. Implemented Remedial Measures

Numerous Interim Remedial Measures (IRMs) were implemented at various areas of the facility prior to selection of WVDEP’s proposed, final remedy to control and contain releases

and prevent exposure to contamination that may have posed unacceptable risks to human health or to the environment. The individual IRMs are listed on Table 2.

In addition, a facility-wide IRM has been implemented for sitewide groundwater to address potential risk from dissolved groundwater contaminants. The USEPA-approved sitewide groundwater monitoring program (Performance Monitoring Program [PMP]) has been in place since 2011 (CH2M 2011b) and was updated with a revised program in 2014 (CH2M 2015). The objectives of the sitewide program are to:

- Determine if concentrations in impacted areas are stable or decreasing;
- Monitor the perimeter of the site to ensure impacts remain onsite;
- Document improvement in water quality;
- Detect and respond to changes in site conditions; and
- Identify areas of the site where additional active remediation may be necessary.

Groundwater monitoring data are evaluated against the following three performance monitoring standards per the sitewide groundwater monitoring program (CH2M 2015):

- **Onsite Containment** – structured to monitor groundwater adjacent to property boundaries and the Kanawha River to evaluate potential offsite migration of constituents of concern (COCs) in both the main chemical plant and WWTU areas
- **Plume Stability** - structured to verify concentrations of groundwater COCs onsite are stable or decreasing in magnitude (i.e., not migrating).
- **Reduction in Constituent Mass** – structured to ensure groundwater quality continues to improve over time as measured by a reduction in the COC mass dissolved in groundwater at the main chemical plant.

If the performance metrics for any of the performance standards are not met, a phased contingency plan is triggered

VII. Final Proposed Measures and Implementation

The proposed remedy for the facility is a combination of engineered remedies and institutional controls (ICs) for soils and groundwater.

A Engineered Remedies

Engineered remedies are designed and constructed physical barriers, structures, or systems intended to contain and/or prevent exposure to contamination, and have either already been implemented as IRMs or are proposed as part of the final remedy. Table 2 lists the active remedies, both IRMs and additional measures, for individual areas across the facility. It is recommended to continue current IRMs (or continued maintenance thereof) to address individual areas and facility groundwater (via continued implementation of the PMP).

B Institutional Controls

Types of ICs

ICs are non-engineered instruments, such as administrative and legal controls, that impose restrictions on use of contaminated property or resources to minimize the potential for human exposure to contamination and protect the integrity of a remedy. ICs to be applied at various EUs and/or individual SWMUs at the facility are indicated on Table 2. A description of each type of IC to be implemented as part of the final remedy is as follows:

- **Land Use Restriction to industrial/commercial** – this restriction is being applied at every EU because residential re-use is not appropriate for this facility.
- **Vapor Intrusion (VI) Restriction** – This restriction requires demonstration that there are no potential risks above thresholds due to VI for new/newly occupied buildings. If risks are identified above thresholds, engineering controls must be incorporated into the building(s) to mitigate potential vapor migration. Areas where groundwater concentrations exceed VI screening levels (VISLs) require a VI restriction to protect future exposures to VI in newly constructed or newly occupied structures. This restriction is being applied at every EU except at EU-2.
- **Groundwater Use Restriction** - The only allowable groundwater removal/use is remediation (irrigation, drinking water, etc. uses not allowed). This restriction is required where groundwater impacts are present at concentrations exceeding applicable screening levels (RSLs, MCLs, and VISLs) and should remain in place until groundwater is remediated. This restriction is being applied across the facility as well as in affected offsite areas.
- **Surface Soil Restriction** – This restriction requires that current CAs (e.g., cover and/or fencing) are maintained to prevent direct contact with impacted surface soils. This restriction is being applied to SWMUs 1, 2, 6, and 11 where there is buried waste.
- **Subsurface Earthwork Restriction** – This restriction requires invasive earthwork to be conducted under proper supervision and using appropriate safety precautions, and is relevant to areas where current soil concentrations exceed industrial/commercial worker criteria. This restriction is being applied to specific SWMUs, as necessary (refer to Table 2).
- **Prohibition of Offsite Soil Movement** – This restriction prohibits movement of soil from on-facility locations to locations off the facility (“offsite”) unless a site-specific soil evaluation determines that the soil can lawfully be moved. Materials cannot be sent offsite and/or used in areas that have fewer use restrictions (e.g., residential) unless appropriately evaluated. This restriction is being applied at every EU.

Each IC will be implemented via a West Virginia Environmental Covenant (EC) pursuant to the Uniform Environmental Covenants Act, West Virginia Code Chapter 22, Article 22B. ECs will be finalized following the issuance of the final decision and of the RCRA Corrective Action Permit by WVDEP. In addition, surface and subsurface soil restrictions will be implemented by establishment of a Materials Management Plan (MMP).

Groundwater Performance Monitoring Plan

The USEPA-approved sitewide groundwater monitoring program (PMP) in conjunction with targeted remedial action is designated as the final groundwater remedy as described in Section VI. If annual groundwater data evaluation indicates a potential for risks above thresholds for human health or the environment, the appropriate path forward to address the risk will be noted in the annual facility report and evaluation completed. Evaluation may include reviewing available site data to determine the cause(s) for the potential risk threshold exceedance; collecting additional data to assess site conditions and the need for mitigation; or implementing a focused remedy to manage risk and achieve the RAOs for the facility. The evaluation results and conclusions will be documented in each of the facility’s annual reports.

Environmental Covenants with Neighboring Property Owners

Groundwater concentrations from the facility have impacted portions of several neighboring properties, including the southern portion of the APCO substation, the southwestern portion of WVSU, the eastern portion of the PTO facility, and likely the portion of Norfolk Southern (NS) that traverses the facility's main chemical plant area and WWTU (Figure 1). An EC will be pursued for each of these properties that prohibits groundwater extraction except for remediation purposes or construction dewatering where appropriate (APCO, WVSU, and NS). An EC that prohibits the construction of occupied structures over areas of identified VI risk, unless VI mitigation is completed, is also proposed for the southwest corner of the WVSU property and NS.

C Materials Management Plan

A facility MMP is being prepared to guide the management of subsurface media (subsurface soil, affected groundwater, and buried waste materials) in restricted facility areas noted in Table 2 and shown on Figure 2. It will be a guidance document and not a substitute for activity-specific work plans. (Activity-specific plans to address health, safety, and waste management are required for earthmoving activities, including construction, drilling, remediation, or other actions that may involve worker exposure to site subsurface media).

The MMP provides information on identifying and managing waste streams (soil, sediment, construction debris, landfill waste, purge water, decontamination water) that may be generated during facility earthwork activities. Methods for managing and disposing the wastes, including identification, characterization, onsite management options, proper handling, labeling, storage, transport, and record keeping/ reporting, are addressed.

VIII. Evaluation of Final Proposed Remedy

This section provides a description of the criteria used to evaluate the proposed remedy consistent with USEPA guidance, "Corrective Action for Releases from Solid Waste Management Units at Hazardous Waste Management Facilities; Proposed Rule," 61 Fed. Reg. 19431, May 1, 1996. The criteria are applied in two phases. The first phase evaluates three decision threshold criteria as general goals. The second phase, for those remedies that meet the threshold criteria, involves an evaluation of the seven balancing criteria.

A Threshold Criteria

Protect Human Health and the Environment

The proposed remedies are protective of human health and the environment by eliminating, reducing, or controlling threats through ICs, engineering controls, removal or treatment.

Groundwater

Implementation of the established groundwater PMP is protective by detecting changes in site conditions and providing a response process to prevent unacceptable human health or environmental risk based on exposure to impacted groundwater. The annual PMP process adequately determines whether concentrations in impacted areas are stable or decreasing; monitors the site perimeter to ensure impacts remain onsite; documents improvement in water quality; detects and responds to changes in site conditions; identifies site areas where additional active remediation may be necessary; and manages offsite concentrations through ECs.

Surface and Subsurface Soil and Waste Materials

The engineered remedies and ICs identified for the various areas across the facility (Table 2) have been demonstrated to be protective of human health and the environment. Waste-in-place areas are capped with soil covers and access to the areas is controlled by ICs such as signage and fencing. Areas with implemented groundwater or soil vapor extraction IRMs are being monitored to confirm decreasing concentrations or determine that additional measures are necessary. The facility's MMP stipulates work procedure requirements for the protection of site workers when performing subsurface work in the areas with subsurface work restrictions (Figure 2, Table 2).

Achieve Media Cleanup Objectives

The proposed remedies meet the media cleanup objectives based on current and reasonably anticipated land and water resource use(s). The remedy proposed is based on the current and future anticipated land use at the facility as commercial or industrial.

The proposed groundwater remedy for the facility implements groundwater use restrictions and maintains a groundwater monitoring program to demonstrate that the contamination is being reduced through IRMs already implemented and through natural attenuation. It is anticipated that groundwater concentrations will ultimately achieve RAOs through these mechanisms at the facility as well as at affected offsite areas.

Surface or subsurface soil restrictions are required at those areas of the facility where current concentrations exceed risk thresholds, or where the presence of subsurface waste requires excavation restrictions. Although these restriction areas may have soil concentrations that do not achieve soil media cleanup objectives, engineering controls and work restrictions required in the MMP will prohibit direct contact by workers with the affected areas. Ongoing maintenance and monitoring of covered areas will continue through the life of the proposed remedies to maintain their effectiveness (as stipulated in the MMP).

Remediating the Source of Releases

The proposed remedies eliminate or reduce further releases of hazardous wastes and hazardous constituents that may pose a threat to human health and the environment. Numerous IRMs at site-specific regions of the facility have remediated groundwater, soil vapor, and soil concentrations to more manageable levels. Covers in place over former landfilled areas reduce infiltration of surface water through these areas, resulting in a reduction in the potential for contaminant leaching.

B Balancing/Evaluation Criteria

Long-Term Effectiveness

Implementation of the CA permit, including enactment of the proposed remedies, will ensure long-term effectiveness of the approved remedies for the SWMU-related releases and ensure the ongoing protectiveness of human health and the environment.

Long-term effectiveness for management of groundwater concentrations beneath neighboring properties will be enforced through an EC for each of the affected properties (APCO, WVSU, NS, and PTO).

Reduction of Toxicity, Mobility, or Volume of the Hazardous Constituents

The volume of some hazardous constituents in various media (soil, groundwater, soil vapor) has been reduced during implementation of IRMs (Table 2). Further reduction of toxicity, mobility, and volume of hazardous constituents will continue by natural attenuation at the facility and at properties bordering the facility (APCO, WVSU, NS, PTO), and through continued operation of IRM systems (in CMS Area A and CMS Area B). Further reduction of contaminants in groundwater will be accomplished by the engineered covers placed on the soil-contaminated and waste-in-place areas, and will be verified by the results of the groundwater PMP.

Short-Term Effectiveness

The proposed remedy provides short-term effectiveness and does not involve construction or excavation activities that would pose additional short-term risks to workers, residents, or the environment.

Implementation

The proposed remedy is readily implementable. Groundwater monitoring is already in place and operational. The ICs can be implemented through an enforceable mechanism such as the CA Permit and/or ECs pursuant to the West Virginia Uniform Environmental Covenants Act.

Cost

The proposed remedy is cost effective. The significant costs associated with this proposed remedy are associated with IRMs already completed (Table 2). The costs associated with recording and enforcing the CA Permit and/or ECs are expected to be minimal.

Community Acceptance

WVDEP will evaluate community acceptance of the proposed remedy during the public comment period, and it will be described in the Final Decision and Response to Comments.

State Support/Agency Acceptance

WVDEP has reviewed and concurred with the proposed remedy for the facility. Furthermore, USEPA has provided input and has been involved throughout the investigation and remedy selection process. WVDEP will prepare and issue the CA Permit.

IX. Financial Assurance

The facility owner will be required to demonstrate and maintain financial assurance for completion of the remedy pursuant to the standards contained in West Virginia regulations. The Permittee shall maintain compliance with 40 CFR §264.17, Subpart H by providing financial assurance, as required by 40 CFR §264.17, Subpart H, in at least the amount of the cost estimates required by section. Financial Assurance details for the RCRA CA will be incorporated into the WVDEP-issued RCRA CA Permit.

ATTACHMENT 1
ADMINISTRATIVE RECORD INDEX

CH2M. 2009. *Final Current Conditions Report, Institute Facility*. October.

CH2M. 2011a. *Human Health Risk Assessment for Soil and Groundwater Work Plan, Bayer CropScience Institute Facility, Institute, West Virginia*. November. Finalized May 2012 as the *Human Health Risk Assessment for Soil Work Plan, Bayer CropScience Institute Facility, Institute, West Virginia*.

CH2M. 2011b. *Sitewide Groundwater Performance Monitoring Plan*. Bayer CropScience Institute Facility. Prepared for West Virginia Department of Environmental Protection and USEPA. February.

CH2M. 2015. Final Report. *2014 Groundwater Performance Monitoring Report. Bayer CropScience Institute Facility, Institute, West Virginia*. April.

CH2M. 2016. Amended Final Report. *Corrective Measures Proposal. Institute Facility, Institute, West Virginia*. December.

REMCOR 1992 – *Verification Investigation Report, Rhone-Poulenc Ag Company, Institute, West Virginia*. July.

USEPA 2011 – “Inclusion of Bayer CropScience, Institute Facility Waste Water Treatment Plant as an Area of Concern (AOC) under the Corrective Action Permit (WVD 00500 5509).” September 26.